

Customer No.: 31561
Application No.: 10/710,020
Docket No.: 10547-US-PA

REMARKS

Present Status of the Application

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bojkov et al. (U. S. Pub. 2004/0140219; hereinafter Bojkov) in view of Chung et al. (U. S. Patent 6,409,903; hereinafter Chung) and Jao (U. S. Patent 6,415,974). Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bojkov in view of Chung, Jao, and Ihara et al. (U. S. Patent 6,030,512; hereinafter Ihara). Claims 1-11 remain pending in the present application, and reconsideration of those claims is respectfully requested.

Discussion of Claim Rejections under 35 USC 103

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bojkov in view of Chung and Jao. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bojkov in view of Chung, Jao, and Ihara. Applicants respectfully traverse the rejections for at least the reasons set forth below.

With respect to claims 1-10

1. As previously stated, the present invention is to solve the plating issue when many openings with various widths are under plating. Due to different opening width, the conventional

Customer No.: 31561
Application No.: 10/710,020
Docket No.: 10547-US-PA

plating quality is poor. The present invention proposes the plating method with increasing step current.

2. In re Bojkov, as noted by the Office Action, Bojkov does not disclose the opening with different widths and increasing the current. Particularly, the currents are in two levels by alternating change.

3. In re Chung, as described by Chung (col. 7, lines 14-17), Chung is to avoid the detrimental burn-through of the seed layer 23 of the wafer 22 in Figs. 1 and Fig. 2. The Office Action has referred to Abstract and Fig. 4 of Chung about disclosure of increasing current.

However, the increasing current of Chung is in different mechanism from Bojkov. If the combination is made, the operation in Bojkov is destroyed. The combination does not provide the missing features in Bojkov about increasing step current, and even be improper either because the operation mechanism of Bojkov is destroyed.

4. In re Jao, Jao is cited by the Office Action to provide the different opening width. As shown in Fig. 3A, the mask layer 320 has the openings in different width. However, Jao does not additionally disclose the motivation in combining Bojkov and Chumh to achieve the present invention.

Customer No.: 31561
Application No.: 10/710,020
Docket No.: 10547-US-PA

Alternatively in another point of view, Jao never proposes the plating current as recited in the present invention due to high aspect ratio, and neither in Bojkov and Chung. In other words, without hindsight, Bojkov, Chung and Jao, either in combination or alone, do not render the unexpected results.

Therefore, independent claim 1 with dependent claims 2-10 indeed patently define over the prior art references.

With respect to claim 11

5. As previously stated, the present invention is to solve the plating issue when many openings with various widths are under plating. Particularly, at least one of the openings has the aspect ratio by about greater than 1.2, which means the depth of the opening is greater than the width. Due to the narrow opening, the conventional plating quality is poor. The present invention proposes the plating method for this kind of narrow opening.

6. In re Ihara, Fig. 4 with description of col. 6 line 67- col. 7 line 6 has been referred. However, Ihara disclose the method being very different from the present invention and the prior art references.

Ihara is based on the mechanism as shown in Fig. 2 for spraying the plating solution through the nozzle 40 (col. 21-44). Ihara is in very different mechanism without considering the plating

Customer No.: 31561
Application No.: 10/710,020
Docket No.: 10547-US-PA

current. Ihara does not suggest that the opening with high aspect ratio is used under the plating mechanism of the present invention.

More particularly, Ihara does not specifically disclose the aspect ratio by greater than 1.2, which is not equal to "not less than 1 by Ihara".

7. When considering the present invention as whole, dependent claim 11 has produced the unexpected result in plating by controlling the plating current without need of the nozzle.

For at least the foregoing reasons, Applicants respectfully submit that independent claim 1 patently defines over the prior art references, and should be allowed. For at least the same reasons, dependent claims 2-10 patently define over the prior art references as well. Claim 11 further distinguish over the prior art references.

Customer No.: 31561
Application No.: 10/710,020
Docket No.: 10547-US-PA

CONCLUSION

For at least the foregoing reasons, it is believed that all the pending claims 1-11 of the invention patently define over the prior art and are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

Respectfully submitted,

Date :

April 4, 2007

Belinda Lee

Belinda Lee

Registration No.: 46,863

Jianq Chyun Intellectual Property Office
7th Floor-1, No. 100
Roosevelt Road, Section 2
Taipei, 100
Taiwan
Tel: 011-886-2-2369-2800
Fax: 011-886-2-2369-7233
Email: belinda@jicpgroup.com.tw
usa@jicpgroup.com.tw